

Southwest Regional Partnership – Phase III @ Price, Utah



Regional Carbon Sequestration Partnerships Annual Project Review Meeting • Dec 12 - 13, 2007 • Pittsburgh, Pennsylvania

Background

■ The <u>Southwest Partnership</u> is composed of 8 partner states, each contributing expertise from state agencies, universities, private companies, national laboratories, and non-profit organizations. The SWP is committed to finding the best approach for capturing and permanently storing CO₂.

■ Three phases of progress...

Phase I (2003) - Characterize or assess sources of CO2, the capacity/viability proximity of CO2 sinks, as well as economic and regulatory factors.

Phase II (2005) - Validation of small-scale, field-based injections and accompanying monitoring at pilot sites in New Mexico, Utah and Texas.

PHASE III (2008) -





Goals

- Larger-scale demonstration of CO₂ capture, transport and injection with long-term safety, storage and economics a primary objective.
- initial (year 1) injection of approximately 300,000 U.S. tons of CO2.
- ultimate (years 3 & 4) injection of approximately 1,000,000 tons of CO2.

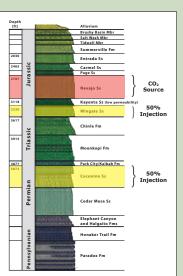


Goals ...cont

- Evaluate .
- n technical viability and practicality for future commercialization.
- engineering (transportation, injectivity, etc.).
- u risks (health, environmental, financial).
- monitoring efficacy
- Primary goal will be to provide a framework for eventual commercial ventures in CO₂ sequestration in the southwest.

Deployment

- Geological target
 - Deep saline formation within sedimentary basin common throughout the Southwest Partnership.
 - Ideal is formation composed of interlayered seals (mudstones, claystones and siltstones) and high-permeability, high-porosity sandstones.
 - u The Farnham Dome CO₂ field near Price, Utah provides all of the requisite geological requirements.

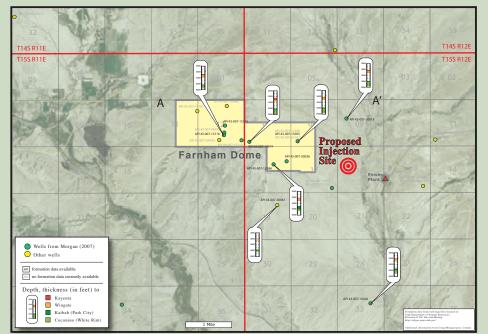


Location

■ Farnham Dome CO₂ Field at Price, Utah

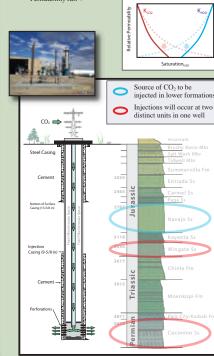






Injection

- Farnham Dome a Laramide basement anticline with a thick package of Cretaceous to Cambrian sediments
- $\mbox{\ensuremath{\square}}$ The Navajo Sandstone is a significant source of CO2. Drilling has been intermittent since the 1920's, with 5 billion cubic feet produced from an estimated 430 BCF in the reservoir. The Navajo Ss will be tapped as the ready supply of CO2 to be used for the injection into deeper sandstone sinks.
- □ Two distinct formations will serve as injection targets: the Coconino (White Rim) and Wingate Sandstones. The Kaibab (Park City) shales and limestones will serve as the seal for CO₂ nijected into the Coconino. The low permeability Kayenta sandstone/shale will serve as the seal for CO₂ nijected into the Wingate and will further test the concept of the "Permeability Isil"



Monitoring

- Techniques
- Introduced and natural tracers (travel time, partitioning of CO₂ into brine or oil, sources of CO₃)
- Water composition (Major ions, trace elements, salinity)
- Subsurface pressure (Formation pressure, annulus pressure, aquifer pressure)
- Well logs (Brine salinity, sonic velocity, CO2 saturation)
 Time-lapse 2D and 3D seismic (P & S velocity, reflection horizons, attenuation)
- Vertical seismic profiling (P & S velocity, reflection horizons, attenuation)
- Passive seismic monitoring (location, magnitude, source characteristics)
- □ Electrical techniques (Formation conductivity)
 □ Time-lapse microgravity (Density changes from fluid displacement)
- CO₂ land surface flux monitoring
- CO₂ land surface flux monitoring using flux chambers or eddycovariance (gas composition, isotopic analysis
- Soil gas sampling (gas composition, isotopic analysis)
- Land surface deformation (tiltmeters, interferometry, GPS)

Benefits

Technical Benefits

- The close proximity of the CO₂ source (Farnham Dome CO₂ Field) to the injection location (hundreds of meters) translates to lower transport costs and faster deployment.
- The Farnham Dome field is already a known CO₂ storage site; the Navajo Sandstone contains an estimated 430 BCF of CO₂ with little known leakage. Potential migration of CO₂ injected into the Coconino and Wingate target formations will be mitigated by the seals above the Navaio.
- Production from the Dome's multiple Navajo (source) CO₂ wells allows for easy monitoring of any potential migration of the injected plume.

Regional Benefits

a Approximately 350 million tonnes of CO2 per year are released from the regions point sources. Over the next 100 years, this translates to 32 billion tonnes of necessary storage capacity. SWP's Phase III analysis will provide an initial estimate of the capacity of the Coconino and Wingate formations.

